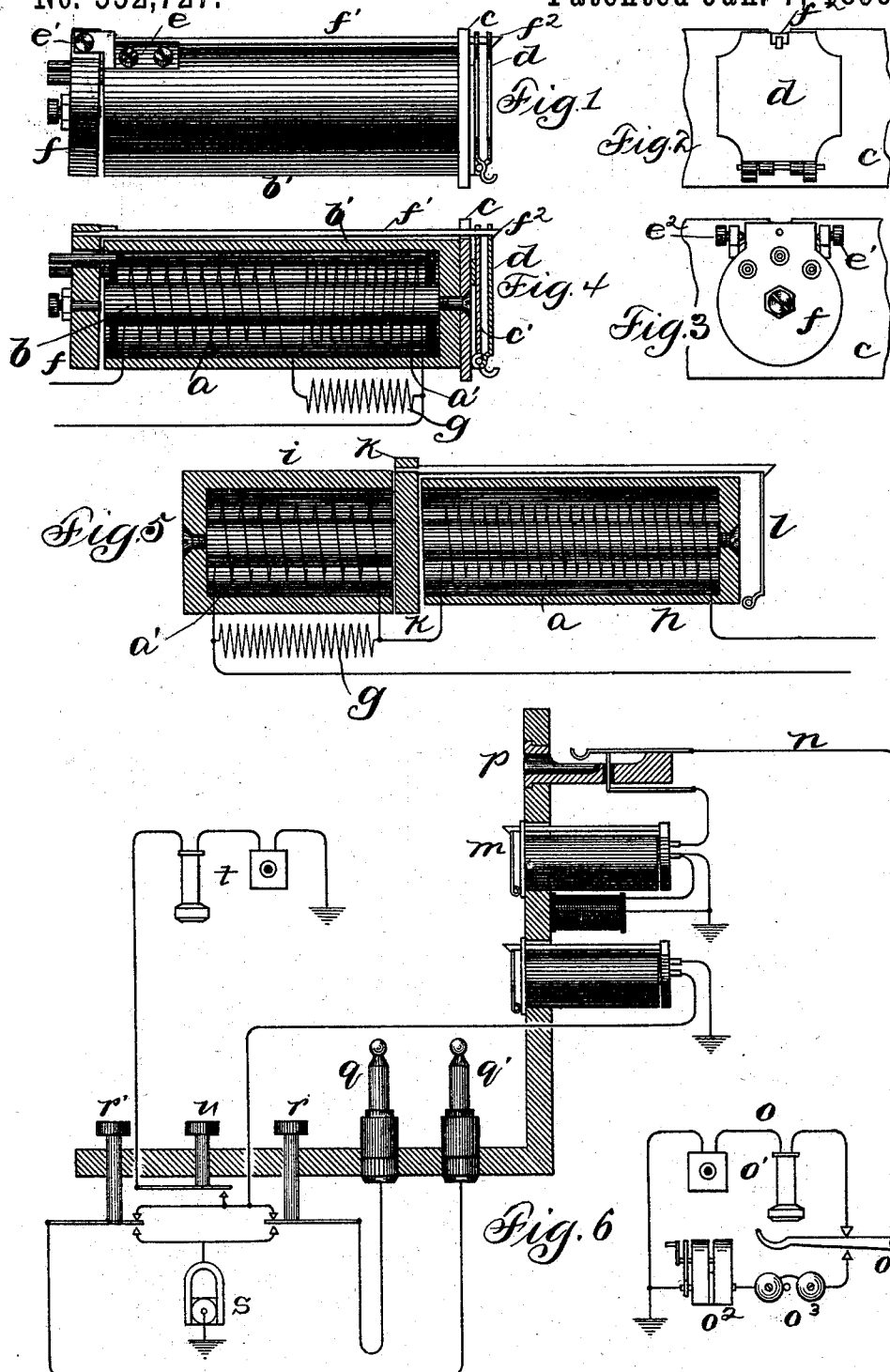


(No Model.)

C. E. SCRIBNER.
ANNUNCIATOR FOR TELEPHONE SWITCHBOARDS.

No. 552,727.

Patented Jan. 7, 1896.



WITNESSES
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UNITED STATES PATENT OFFICE.

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ANNUNCIATOR FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 552,727, dated January 7, 1896.

Application filed May 2, 1893. Serial No. 472,719. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Annunciators for Telephone-Switchboards, (Case No. 324,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to electric annunciators for use in connection with telephone-lines at central offices. Its object is to produce an annunciator adapted to receive and respond to signaling-currents of rapidly-alternating character but to remain inert when traversed by approximately continuous currents.

The annunciators for telephone-lines ordinarily in use respond equally well to the alternating currents commonly employed in transmitting signals between stations and to continuous currents. Hence in telephone-exchange systems comprising grounded or earth-return telephone-lines the annunciators are frequently operated by leak or induced currents from extraneous sources, particularly by continuous currents finding circuit from earth at a sub-station to earth at the central station when either station is in proximity to a grounded electric-railway system. The annunciators are thus caused to give false signals, creating confusion at the central office.

In my improved annunciator I have employed the usual indicator controlled by a movable armature. In combination with this armature I have arranged two helices adapted to act differentially upon the armature, one of the helices being constructed of high impedance or self-induction and being shunted by a non-inductive resistance. The helices are connected in series in the same circuit. Their resistances and that of the non-inductive resistance-coil are so adjusted with relation to each other that when a continuous current is sent through the circuit the two helices annul each other's effect upon the armature, so that the latter remains inert. When, however, an alternating current trav-

erses the circuit, only a small portion of the current passes through the helix of high impedance, being shunted therefrom by the non-inductive resistance, so that the other helix greatly predominates in its effect upon the armature and the latter is actuated to release or operate the indicator. In practice the two helices may be disposed upon the same magnet-core suitably arranged with relation to the armature, or they may be placed upon different cores arranged to operate differentially upon a common armature. I am thus enabled to construct an annunciator which, while remaining sensitive to signaling-currents of rapidly alternating or pulsating character, is irresponsive or inoperative when traversed by approximately continuous currents, such as those which accidentally find circuit through the line.

My invention is illustrated in the accompanying drawings, wherein I have shown the two different modifications of my annunciator before mentioned and have shown one of them in connection with a telephone-line circuit.

Referring to the drawings, Figure 1 is a side elevation of one form of my annunciator. Fig. 2 is a front elevation thereof. Fig. 3 is a rear elevation of the same. Fig. 4 is a longitudinal sectional view of the annunciator, the helices being represented diagrammatically to show the circuit connections. Fig. 5 is a similar sectional view of another form of my annunciator, the circuits being also shown in diagram. In Fig. 6 a form of annunciator such as disclosed in Figs. 1 to 4 is shown located upon a telephone-switchboard of ordinary type and connected in a telephone-line extending from the central station to a sub-station.

In the form shown in Figs. 1, 2, 3 and 4, the two helices *a* and *a'* are wound upon the same core *b*, which is arranged in combination with a shell *b'* to constitute a tubular electromagnet. The shell *b'* is secured by a screw to a supporting or base plate *c*, which may be common to several such annunciators. Upon the opposite side of the plate *c* is fixed a smaller plate *c'*, upon the face of which any suitable number or indication is marked. A shutter or shield *d* is hinged at the lower edge

to extensions of the plate c' , the hinge being placed a little at one side of the center of gravity of the shutter d , so that the latter tends to fall outward. The shell b' of the magnet carries a small bracket e provided with trunnions e' e'' , upon which the armature f of the electromagnet is pivotally supported. The armature f carries an arm f' extending forward through a slot in the plate c , and terminating in a catch f^2 adapted to engage with the shutter d and retain it in its vertical position. When the armature f is attracted by the electromagnet it raises the catch f^2 out of engagement with the shutter d and allows the latter to fall into a horizontal position, disclosing the number or indication painted upon the face of the plate c' .

The helix a may be of moderate resistance—say five hundred ohms—and may be wound with comparatively coarse wire. The helix a' is wound with many turns of finer wire, so that it possesses a much greater self-induction than the helix a . The helix a' is shunted by a resistance-coil g , which is wound to be non-inductive, and whose resistance may be equal to or somewhat less than that of the helix a' . The helix a' is wound to have the same number of ampère turns, shunted as it is by the resistance g , as the helix a and the connections are such that the two helices tend to magnetize the core in opposite directions—that is, the helices are so adjusted that when a continuous current finds circuit through the device the magnetizing effect of the helix a is balanced and neutralized by that of the helix a' . Thus with such current the magnet remains neutral and the annunciator is not operated. When, on the other hand, a variable current, as an alternating-signaling current, flows through the circuit including the annunciator, the entire current is compelled to traverse the helix a ; but having passed through that coil it divides at the terminal of helix a' , by far the greater portion of it finding circuit through the non-inductive resistance-coil g and only a very small portion traversing the helix a' on account of the high impedance of the latter. The helix a , therefore, creates a magnetized condition of the core, almost unopposed by the helix a' . The armature is thus attracted to its magnet and releases the indicator, giving the signal.

In Fig. 5 another form of the annunciator is shown in which the two helices are placed upon separate cores, which are arranged to act differentially or in opposite directions upon a common armature. Thus in this magnet the helix a constitutes the coil of a tubular magnet h , while the helix a' is placed upon a separate core in another tubular magnet i . The shell of the latter magnet is made of large cross-section, so that the magnetic circuit of the helix is thick and of low magnetic resistance, whereby great self-induction of the magnet is obtained. The poles of the two magnets h and i are presented to opposite

sides of the common armature k , which is pivoted as in the other form, and carries a catch controlling a similar indicator l . In this form also a non-inductive resistance g is placed in shunt of the helix a' . Moreover, the helices are proportioned with respect to their ampère windings and resistance as they were in the annunciators before described. In this instance, however, they do not act to neutralize each other's effect upon the cores of the magnets, but act differentially upon the common armature. The operation is similar to that of the preceding form.

In Fig. 6 an annunciator m of the form first described is shown located upon a telephone-switchboard of the ordinary type. The annunciator is connected in a circuit n , which extends from earth at the exchange over the line-wire to earth at the sub-station o . At the sub-station are provided the usual telephonic apparatus o' , and the signaling appliances comprising a generator o^2 of alternating current and a polarized bell o^3 , the different apparatus being connected with a switch-hook o^4 , by which either the telephonic instruments or the signaling apparatus are connected with the line n according as the telephone-receiver is removed from or placed upon the switch-hook. At the exchange the line is also connected with a spring-jack p for establishing connection to the line. The switchboard is shown as equipped with the usual connecting appliances, comprising a pair of connecting-plugs q q' adapted for insertion into the spring-jacks, the plugs being connected together by flexible conductors. Calling-keys r and r' are included in the circuit between the different connecting-plugs, either of which keys is adapted to disconnect one of the plugs from the other and to connect it to one pole of a generator s of signaling-current. An operator's telephone-set t is also provided, connected with a key u , the depression of which connects the telephone to the cord-circuit.

In establishing connection between the different lines of the exchange system, the different plugs q and q' are inserted into the spring-jacks p of the respective lines, whereby the annunciators m of the lines are disconnected and the line-circuits are connected together through the medium of the conductors joining the plugs. The mode of operation of such apparatus is, however, well understood by those skilled in the art, and I do not consider further description necessary.

In a system thus provided with my improved annunciator signals may readily be sent from the sub-stations, as o , by means of the signaling-generators o^2 , and the annunciators m in the line-circuits will readily respond to the alternating-signaling current and will indicate the signal to the attendant operator; but any continuous, or approximately continuous, current, finding circuit from earth at the sub-station through the line-circuit, including the annunciator to earth at

the central station, will traverse the annunciator without actuating its armature, and thus without causing any false indication.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with two magnetic helices, included in the circuit in series of a shunt circuit of low impedance about one of the helices, the branch of the circuit containing the shunted helix being of high impedance, an armature in the fields of both helices, the helices being arranged to act differentially or oppositely upon the said armature when energized, whereby the armature is actuated only when the helices are traversed by variable currents.

2. The combination with two helices connected in series in an electric circuit, one of said helices being of high impedance, of an armature common to said helices, the helices being arranged to operate differentially or oppositely upon the said armature, and a non-inductive resistance in shunt of the helix of high impedance, substantially as described.

3. In combination with two helices in series in an electric circuit, one of which is of high impedance, an armature in the fields of both helices, the helices being arranged to act differentially or oppositely upon the said armature, an indicator controlled by the armature, and a non-inductive resistance in shunt of the helix of high impedance, substantially as described.

4. The combination with two magnetic helices in series in an electric circuit, of a shunt circuit about one of the helices, a movable armature in the fields of both helices, one of the helices being constructed to have high impedance, and the ampère turns of the two helices being so adjusted with relation to each other that when a continuous current traverses the two helices they annul each other's

effect upon the armature, whereby the armature is actuated only when the helices are traversed by varying currents, substantially as described.

5. The combination with two electromagnetic helices in an electric circuit, of a core common to the two helices and a shunt circuit of comparatively low impedance about one of the helices, the windings of the helices being so proportioned that when traversed by continuous currents they annul each other's effect upon the core, whereby the core is magnetized only when the helices are traversed by variable currents.

6. The combination in an electric annunciator, of two helices in the same circuit, a shunt circuit of comparatively low impedance about one of the helices, a core common to the two helices, a movable armature for the said core and an indicator controlled by the armature, the windings of the helices being so proportioned and arranged with respect to each other that when traversed by continuous currents they annul each other's effect upon the core, substantially as specified.

7. The combination with a telephone line circuit, of an annunciator included therein comprising two helices in series in the circuit, a shunt circuit of comparatively-low impedance about one of the helices, a movable armature common to the said helices and an indicator actuated thereby, the circuit of the shunted helix being of high impedance, and the windings of the helices being proportioned and arranged to operate differentially upon the armature, substantially as described.

In witness whereof I hereunto subscribe my name this 22d day of March, A. D. 1893.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,
LUCILE RUSSELL.